

Pardeep Singh
Anwasha Borthakur *Editors*

Trash or Treasure

Entrepreneurial Opportunities in Waste
Management

 Springer

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From Waste to Wealth: The Impact of Waste Entrepreneurship on the Circular Economy



Sourav Mondal, Abhishek Kumar, Himanshu Gupta, and Saumya Singh

The circular paradigm shift—the need for systemic change to enable a circular economy
—Michael Hanf

Abstract In recent years, due to rapid industrialization and escalating environmental challenges, several sustainability concepts, such as waste entrepreneurship and the circular economy, have become pivotal in reshaping economic, social, and environmental paradigms. Departing from linear models, the circular economy concepts advocate for reuse, reduction, and regenerative approaches to tackle pressing concerns such as waste management, environmental pollution, and climate change. In addition, waste entrepreneurship, aligned with circular economy principles, transforms waste into valuable resources, contributing to environmental as well as social sustainability and economic development. The chapter delves into the background and context of waste entrepreneurship and the circular economy, concentrating on resource efficiency and waste management. All of this also plays a crucial role in this transition, driving innovation in product design and supply chain management. Government policies and incentives are important in overcoming challenges and facilitating the shift to sustainable activities. In this chapter, the evolution of waste entrepreneurship, the circular economy, and their alignment with the SDGs are also explored.

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Keywords Waste entrepreneurship · Circular economy · Environmental sustainability · Sustainable development goals · Resource efficiency · Waste management

1 Introduction

In the middle of increasingly pressing environmental issues, the notions of waste entrepreneurship, circular economy, and sustainable development have evolved as essential components within the worldwide dialogue surrounding environmental sustainability. The aforementioned triangle signifies a fundamental shift in economic paradigms, departing from conventional linear models that adhere to a ‘take-make-dispose’ framework and instead embracing more sustainable and regenerative approaches (Rose & Bharadwaj, 2023). The transition described is motivated by the pressing necessity to confront worldwide environmental challenges, including the depletion of resources, climate change, and the accumulation of waste. These difficulties present substantial risks to both ecological equilibrium and human welfare (Panchal et al., 2021). As an influential methodology, waste entrepreneurship presents novel tactics for converting waste materials into valuable resources. The notion in question exhibits a strong correlation with the fundamental tenets of the circular economy, which places significant emphasis on the imperative of achieving closed-loop systems within product life cycles as a means of mitigating waste and optimizing resource utilization (Cainelli et al., 2020; Sigüenza et al., 2020). Waste entrepreneurs, by virtue of their inventive activities, make significant contributions to both environmental sustainability and the exploration of novel economic prospects while also fostering social innovation. The relevance of these practices is further highlighted in the context of sustainable development. The “United Nations’ Sustainable Development Goals” (SDGs) provide a global framework for addressing significant challenges such as poverty, “inequality”, “climate change”, “environmental degradation”, and prosperity. Waste entrepreneurship and circular economy models directly contribute to several SDGs, including SDG 12 (“Responsible Consumption and Production”), SDG 11 (“Sustainable Cities and Communities”), and SDG 13 (“Climate Action”), by promoting sustainable consumption patterns, fostering innovation in waste management, and mitigating environmental impacts (Puntillo, 2022). However, transitioning to a fully circular economy presents numerous challenges. These include technological barriers, market dynamics, consumer behavior, and policy frameworks often favoring linear economic practices. Overcoming these challenges requires a multi-faceted approach involving stakeholders across various sectors, including government, industry, academia, and civil society. The notion of waste entrepreneurship extends beyond merely optimizing waste management practices, encompassing a fundamental reconceptualization of trash as a valuable resource (Kurniawan et al., 2023). The alteration in perspective holds significant importance in advancing a sustainable economy. Entrepreneurs operating within this particular industry are engaging in innovative practices within the domains of material science,

product design, and supply chain management. Their objective is to develop goods and implement procedures that minimize waste and actively contribute to waste reduction.

Furthermore, the circular economy concept is increasingly being recognized as a feasible substitute for the linear model, providing a structured approach to achieve sustainable economic development while mitigating environmental consequences. The authors Batista et al. (2023) and Kinally et al. (2022) underscore the significance of prioritizing the design of products with attributes such as durability, reparability, and recyclability. This approach mitigates the ecological impact related to the lifecycle of products. The transition towards circularity necessitates a comprehensive alteration in the approach to product design, utilization, and recycling. Waste entrepreneurs are playing a leading role in driving this transformative process. Using the concepts of the circular economy to trash entrepreneurship has significant implications for governance and policy. Governments and regulatory agencies significantly impact creating a climate conducive to circular practices, as demonstrated by the research conducted by Tleuken et al. (2022) and Yang et al. (2022). Policy, incentives, and regulation implementation are used to accomplish this. These measures could help remove some of the current barriers and make the transition to a circular economy more accessible. The revolutionary power of waste entrepreneurship and its connection to the circular economy are examined in this book chapter. The ideas of garbage entrepreneurship and the circular economy are examined in this chapter, along with their interactions. This study examines various waste-to-wealth applications and assesses how they affect social, environmental, and economic factors. This study also recommends thorough discussions of waste-to-wealth firms to attain long-term sustainability.

2 Background and Context of the Circular Economy

Rapid industrialization encourages economic progress but is also responsible for pollution, waste creation, and global warming (Raihan, 2023; Su et al., 2013). The “circular economy” concept has gained prominence, emphasizing resource efficiency and waste reduction. It is widely acknowledged that the circular economy has been gaining popularity in recent years as a way to address the environmental challenges associated with traditional linear economic models (Henriques et al., 2023; Omri et al., 2018; Reike et al., 2018; Su et al., 2013). The foundation of a “circular economy” lies in prolonging resource retention, maximizing their value extraction, and ultimately recovering and restoring goods and resources after their life cycle (Morseletto, 2020). Here, the concept of the circular economy comes in, which uses waste as a resource through reducing, recycling, regenerating, and reusing (Morseletto, 2023). As a circular economy deals with minimizing or eradicating waste and effluence and promoting the regeneration of natural systems, it is an alternate model of the economy (Bjørnbet et al., 2021; Neves & Marques, 2022) (Fig. 1).

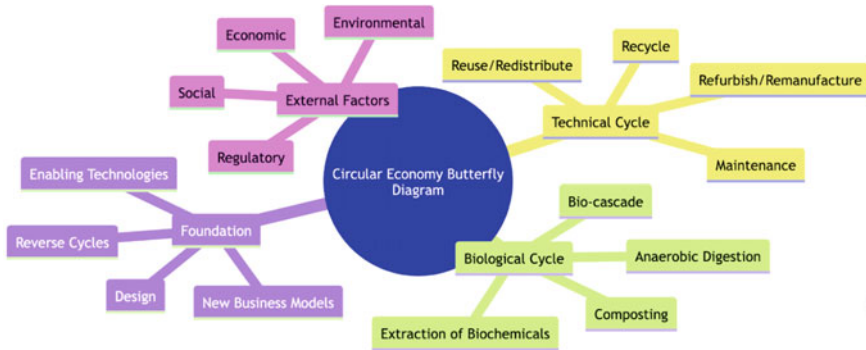


Fig. 1 The circular economy butterfly diagram. Adopted from Ellen MacArthur Foundation (2013)

In addition, waste entrepreneurs are entrepreneurial individuals who identify the linkage between innovation and “waste management” and develop a “circular economy” (Adewunmi et al., 2023a; Alan & Köker, 2023). This helps to develop a circular economy and provides competitive advantages besides achieving the SDGs (Dantas et al., 2021; Emmanuel et al., 2022; Schroeder et al., 2019). Further study by Schroeder et al. (2019) shows that the circular economy helps achieve economic, social, and environmental goals and sustainable business models (Morseletto, 2020, 2023). Although the “circular economy” has several potential benefits for society, the environment and economy face several challenges. Hull et al. (2021, Oliveira et al. (2018) perform a literature review, and this study identifies challenges and opportunities in building a circular economy and shows government laws and stakeholders. In response, the circular economy concept has emerged as a viable alternative, focusing on regenerative systems that minimize waste, promote reuse, and prioritize sustainability. The circular economy helps use waste as a raw material, reduces virgin resource consumption, and aids in closing the loop on materials and products, ensuring that they are kept in use for as long as possible through reuse, remanufacturing, recycling, and refurbishing (Morseletto, 2023). This transition from a linear to a circular model necessitates innovative solutions and transformative approaches to waste management.

Waste entrepreneurship has emerged as a prominent driver in this particular environment, enabling the conversion of waste materials into valuable resources (Alan & Köker, 2023; Gutberlet et al., 2016). Waste entrepreneurs are people or firms characterized by their visionary attitude and capacity to identify potential opportunities inside the waste stream. Individuals or organizations exhibit ingenuity by using discarded resources novelly, eventually converting them into valuable commodities or services. According to Alan and Köker (2023) and Bakry (2015), they have a significant impact on the establishment of a sustainable business ecosystem that yields “economical,” “social,” and “environmental” advantages.

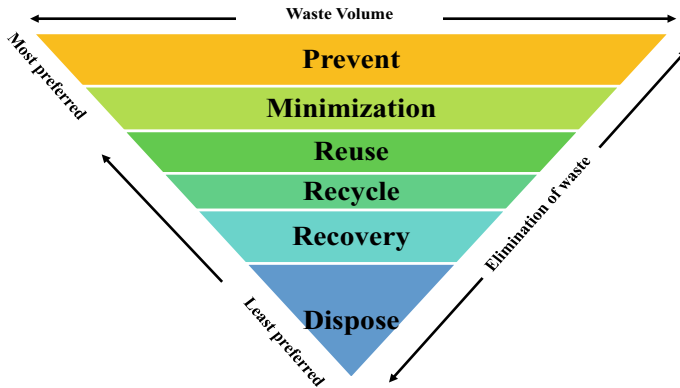


Fig. 2 Waste management hierarchy (authors’ compilations)

Waste entrepreneurs play a significant role in facilitating employment opportunities, supporting economic expansion, and enhancing resource efficiency through the promotion of trash-to-wealth programs.

Furthermore, waste entrepreneurship performs a crucial function in waste management as it facilitates the emergence of inventive approaches aimed at diminishing, repurposing, and recycling waste materials (refer to Fig. 2). By identifying profitable possibilities inside the waste stream, these entrepreneurs significantly contribute to establishing a more circular economy. This economic framework emphasizes the conservation and reuse of resources, therefore reducing adverse environmental effects and fostering economic resilience. This further helps increase environmental, social, and economic sustainability, as well as competitive advantages in a business.

3 The Growing Waste Problem and the Needs for Waste Entrepreneurship

The global waste issue, driven by population growth, urbanization, and changing consumption patterns, poses a significant challenge to both the environment and human well-being. Conventional waste management systems designed for linear economies are struggling to cope with the increasing waste volume, leading to problems like overflowing landfills, pollution, and resource depletion (Kowsari et al., 2023; Mihai et al., 2022). Inadequate waste management has far-reaching consequences, including greenhouse gas emissions like methane from landfills exacerbating climate change and plastic waste harming marine life (Bai & Sutanto, 2002; Baral et al., 2023; Kowsari et al., 2023; Singh et al., 2014). Although toxic chemicals from electronic waste are contaminating soil and water and posing health risks.

To tackle these challenges, waste entrepreneurship has emerged as a promising solution (Faisal & Education, 2018; Gutberlet et al., 2016; Neumeyer et al., 2020). As already mentioned, waste entrepreneurs also help to create value from waste materials and aim to repurpose them for economic and environmental benefits. Their primary goal is to divert waste from landfills and incineration by adopting circular economy principles, reducing the need for raw materials, conserving resources, and lowering energy consumption and emissions. Waste entrepreneurs employ creative strategies to recycle and upcycle waste materials into marketable products, such as converting food waste into biogas or recycling plastic waste into new products (Neumeyer et al., 2020).

Waste entrepreneurship offers numerous social and economic advantages (Adewunmi et al., 2023b; Alan & Köker, 2023). Like other types of entrepreneurship, this type also helps to generate employment opportunities, particularly in local communities, by creating jobs in waste collection, sorting, and processing. Waste entrepreneurs also engage with communities to raise awareness about responsible waste management, encouraging behavioral changes to reduce waste generation. To fully realize the potential of waste entrepreneurship, supportive policy frameworks and funding mechanisms are essential (Gutberlet et al., 2016; Perez, 2021). Governments and institutions should incentivize waste-to-wealth initiatives, provide access to capital and technical support, and promote collaboration between waste entrepreneurs and established industries. Public awareness campaigns can also play a crucial role in fostering a culture of responsible consumption and waste management.

Moreover, the circular economy represents a “regenerative economic model” aimed at replacing traditional linear production and consumption systems (Bag et al., 2021; Borrello et al., 2017; Toker & Görener, 2023). It prioritizes sustainability, waste reduction, and resource efficiency through several key principles and concepts like refuse, recycle, reduce, reuse, refurbish, recover, remanufacture, repair, repurpose, and rethink (de Melo et al., 2022; Kirchherr et al., 2017; Kovačič Lukman et al., 2022; Shao, 2019). Adopting circular economy practices offers various benefits, including responsible resource use, reduced environmental impact, economic growth through innovation and job creation, enhanced supply chain resilience, and community involvement in sustainability efforts (Dantas et al., 2021; Rodriguez-Anton et al., 2019; Schroeder et al., 2019). To facilitate this transition, circular economy frameworks and policies are crucial. Some studies (for example, Kirchherr et al., 2018; Lieder & Rashid, 2016; Scheepens et al., 2016) also show that governments can establish regulatory frameworks, such as extended producer responsibility programs and sustainable procurement policies, while offering financial incentives like grants and tax breaks to support circular initiatives. Industry-specific circular frameworks can address sector-specific challenges and opportunities, encouraging practices like using recycled materials and modular designs in the construction industry. Circular economy policies also promote multi-stakeholder partnerships to facilitate knowledge sharing and innovative solutions.

4 How Waste Entrepreneurship Aligns with Circular Economy Principles

Waste entrepreneurship is a pivotal force in driving the principles of the circular economy, playing a central role in achieving “sustainable development” and mitigating environmental challenges inherent in linear economic models (Kolte et al., 2021; Vatankhah Kaloorazi et al., 2021). These innovative individuals, startups, and established companies recognize the latent value within waste materials and strive to convert them into valuable resources (Alan & Köker, 2023; Banacu et al., 2019). Their contributions are instrumental in advancing the circular economy’s vision, which is characterized by a regenerative and restorative economic system. As circular economy and waste entrepreneurship work on the same objectives, one of the fundamental aspects where waste entrepreneurship aligns closely with circular economy principles is waste prevention and minimization. Waste entrepreneurs actively work to reduce waste generation through inventive solutions such as recycling, upcycling, and waste-to-energy conversion (Prihandoko et al., 2021). By doing so, they aim to prevent waste from ending up in landfills or becoming environmental pollutants, thus aligning with the circular economy’s core principle of “designing out waste” (Alan & Köker, 2023; Murray et al., 2017). In addition to this, resource efficiency is another key facet of the circular economy, and waste entrepreneurship is deeply engaged in maximizing it. These entrepreneurs focus on recovering and reusing materials from discarded products, effectively reintroducing valuable resources back into the production cycle. In this manner, they significantly contribute to circularity and reduce the dependence on finite virgin resources (Ellen MacArthur Foundation, 2013). Circular value chains are at the heart of the circular economy, and waste entrepreneurs are pivotal in their establishment (Kain et al., 2015; Su et al., 2013). They identify opportunities to close the loop by repurposing waste materials and integrating them into new products or applications. This approach promotes circularity within the broader economy, creating a sustainable and resource-efficient ecosystem (Ghisellini et al., 2016). Eco-friendly product design is another cornerstone of waste entrepreneurship, with a focus on creating products that are not only durable but also repairable and recyclable. These environmentally friendly products resonate with the circular economy’s objective of promoting sustainable consumption and production patterns (Bocken et al., 2016). Moreover, innovation and technology adoption are inherent in waste entrepreneurship. Entrepreneurs continuously drive innovation in waste management and recycling technologies, developing and adopting cutting-edge methods to extract value from waste materials. This, in turn, leads to more efficient resource utilization, aligning perfectly with the circular economy’s principles (Korhonen et al., 2018a, 2018b). Some studies also show that environmental and social impact are paramount considerations for waste entrepreneurs. Their efforts prioritize positive outcomes for both the environment and society. By reducing waste, conserving resources, and promoting sustainable practices, waste entrepreneurs contribute to a more environmentally responsible and socially inclusive economic system (Geng et al., 2019).

5 The Evolution of the Concept of Waste Entrepreneurship, Circular Economy and SDGs

The concept of a “circular economy” has evolved in tandem with the global pursuit of “sustainable development”, closely aligning with the “United Nations’ Sustainable Development Goals” (UNSDGs). Initially rooted in principles of waste reduction and resource efficiency, the “circular economy” has emerged as a central framework for advancing several SDGs. These SDGs encompass a diverse array of objectives aimed at eradicating poverty, protecting the environment, and promoting prosperity (Belmonte-Ureña et al., 2021; Fei et al., 2021; Hannan et al., 2021).

Circular economies are intimately interlinked with specific SDGs, notably SDG 8 (“Decent Work and Economic Growth”), SDG 9 (“Industry, Innovation, and Infrastructure”), SDG 11 (“Sustainable Cities and Communities”), and SDG 12 (“Responsible Consumption and Production”) (Puntillo, 2023; Shehata et al., 2022). These objectives underscore the imperative of fostering long-term economic development while simultaneously advocating for more efficient and sustainable resource utilization. Schroeder et al. (2019) underscore the direct contribution of the circular economy to achieving “sustainable development goals”. Their study illuminates how the circular economy aligns with SDG 6 (“Clean Water and Sanitation”), SDG 7 (“Affordable and Clean Energy”), SDG 8 (“Decent Work and Economic Growth”), SDG 12 (“Responsible Consumption and Production”), and SDG 15 (“Life on Land”). Importantly, it delves into the potential synergies between various SDGs, shedding light on potential trade-offs between decent labor conditions, worker safety, human health, and existing circular economy practices, especially in recycling municipal waste, e-waste, and wastewater management. Promoting responsible production and consumption, sustainable industrialization, and climate action are central tenets of the circular economy, closely resonating with SDG 12 (“Responsible Consumption and Production”) and SDG 13 (“Climate Action”). Moreover, the emphasis on social inclusion, job creation, and sustainable livelihoods within the circular economy aligns seamlessly with SDG 8 (“Decent Work and Economic Growth”) and SDG 1 (“No Poverty”), making it an indispensable instrument for advancing the overarching sustainability agenda.

Waste management emerges as a pivotal player in achieving the SDGs, contributing significantly to several key objectives. Effective waste management practices are crucial for promoting “sustainable consumption and production” (SDG 12), encompassing efforts to reduce waste generation, boost recycling rates, and curtail environmental repercussions (Beccarello & Di Foggia, 2022; Khairul Akter et al., 2022). Furthermore, these practices dovetail with SDG 11 (“Sustainable Cities and Communities”) by fostering clean and healthy urban environments, enhancing public health, and elevating overall living standards for urban residents (Beccarello & Di Foggia, 2022; Obaideen et al., 2022). The escalating growth in population, industries, and urbanization has led to a surge in “waste generation”, carrying substantial environmental and societal implications (Cataldo et al., 2022). Sustainable waste

management practices hold the potential to mitigate greenhouse gas emissions, safeguard precious natural resources, and stimulate fresh economic opportunities through the advancement of recycling and waste-to-energy technologies (Brunner & Rechberger, 2015; Cataldo et al., 2022). Moreover, waste management plays a pivotal role in supporting SDG 14 (“Life Below Water”) and SDG 15 (“Life on Land”) by averting marine and terrestrial pollution, conserving biodiversity, and shielding ecosystems from the detrimental effects of waste disposal. Furthermore, sustainable waste management practices actively contribute to “climate action” (SDG 13) by mitigating greenhouse gas emissions associated with landfills and championing initiatives such as waste-to-energy and recycling (see Fig. 3).

6 Key Factors Influencing Waste Entrepreneurship, Circular Economy, and Sustainable Development

Waste entrepreneurship plays a pivotal role in advancing the circular economy by transforming waste into valuable resources, and its impact is shaped by a confluence of factors and drivers (Kolte et al., 2021). This emerging field is motivated by environmental concerns, circular economy principles, market opportunities, economic incentives, innovation, policy support, and social impact. These drivers collectively motivate individuals and businesses to view waste not as a problem but as an opportunity to create positive environmental, economic, and social outcomes (Borthakur, 2020; Kostakis & Tsagarakis, 2022; Schaper et al., 2022; Veleva, 2021). Environmental concerns, such as climate change, pollution, and resource depletion, have raised awareness about the urgent need for sustainable waste management. Waste entrepreneurship aligns with the goal of reducing waste and its environmental impact, making it a compelling driver for environmentally conscious entrepreneurs (Donner & de Vries, 2021; Ghisellini & Ulgiati, 2020). Circular economy principles are at the core of waste entrepreneurship. Entrepreneurs are drawn to the idea of designing out waste, promoting resource efficiency, and closing the loop on materials. This alignment with circularity principles fosters innovative approaches to waste management (Blomsma & Brennan, 2017). Market opportunities are abundant in waste entrepreneurship. With the growing demand for recycled and upcycled products, waste-to-energy technologies, and innovative waste management solutions, entrepreneurs see a chance to tap into previously untapped markets while contributing to sustainability goals. Economic incentives, ranging from cost savings through recycling and resource recovery to revenue generation from selling valuable resources derived from waste, make waste entrepreneurship financially attractive. These incentives not only benefit businesses but also drive economic growth. Innovation and technology are central to waste entrepreneurship. Entrepreneurs are motivated by the challenge of developing innovative technologies and processes to transform waste into valuable products. This emphasis on cutting-edge solutions attracts individuals

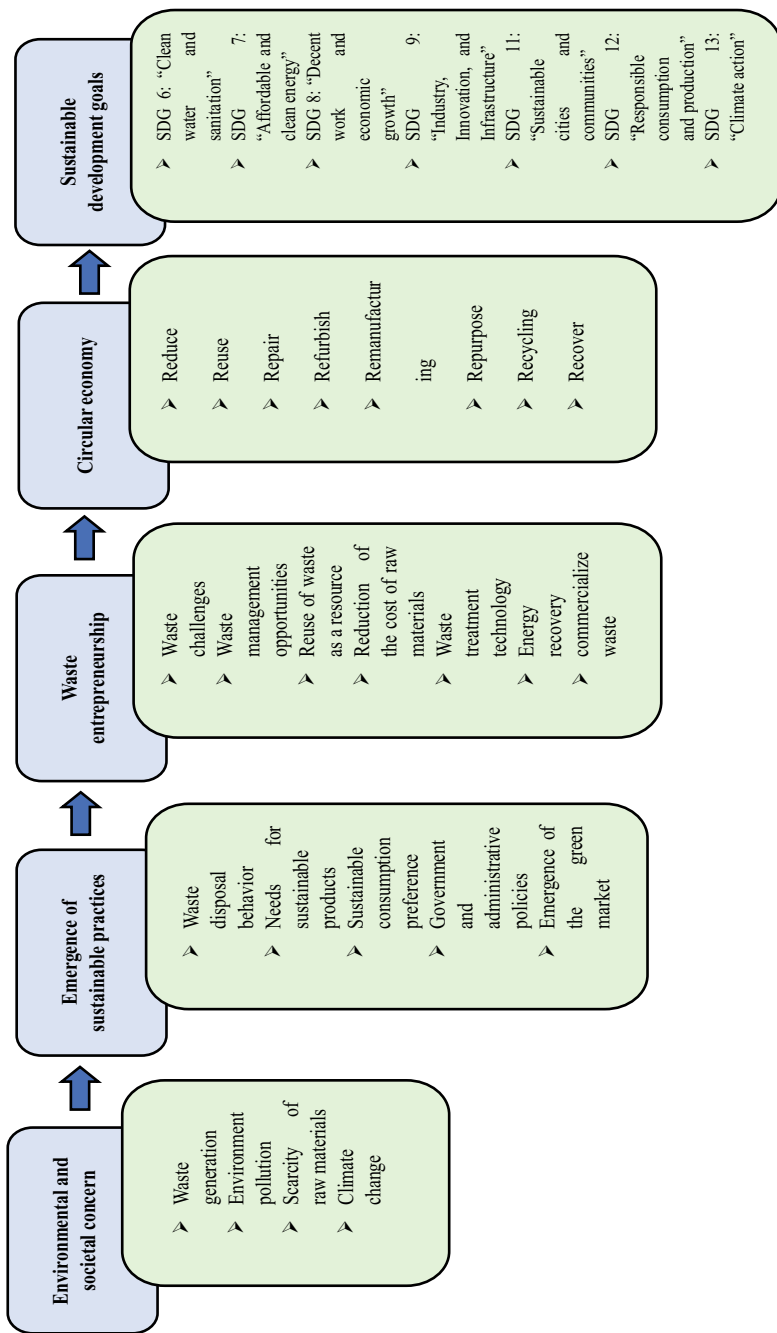


Fig. 3 The nexus between environmental and societal concern, waste entrepreneurship, circular economy and SDGs

and companies to explore waste-to-wealth opportunities (Appala et al., 2022; Demestichas & Daskalakis, 2020). Policy support, including “extended producer responsibility” (EPR) and green procurement policies, creates an enabling environment for waste entrepreneurs to thrive (Campbell-Johnston et al., 2020; Dalhammar et al., 2021; Maitre-Ekern, 2021). Government and institutional support play a critical role in shaping waste management practices and encouraging sustainable entrepreneurship. Social impact is another driver of waste entrepreneurship. By creating job opportunities in waste collection, processing, and recycling, entrepreneurs can drive positive change and empowerment in communities, addressing not only environmental but also social issues. Despite these drivers, waste entrepreneurship faces challenges and barriers that need to be addressed for maximum impact. Shifting consumer behavior toward circular products and practices, coordinating efforts in complex supply chains, and overcoming the lack of awareness about circularity are among the challenges (Lieder & Rashid, 2016). Policy and regulatory obstacles, upfront investment requirements, and competition from linear models also pose challenges to the growth of waste entrepreneurship.

Enabling factors, such as supportive policies, public awareness, funding, infrastructure, collaboration, technology, circular design, and consumer demand, are crucial in fostering the circular economy of waste entrepreneurship (Bocken et al., 2018; Fraccascia et al., 2019; Hofmann & Jaeger-Erben, 2020). These factors provide the necessary support and infrastructure for waste entrepreneurs to thrive, contributing to a more sustainable waste management ecosystem. Innovation and technology adoption in waste management are pivotal in driving the circular economy forward. Cutting-edge recycling technologies, IoT devices, smart sensors, and data analytics are reshaping waste management practices, making them more efficient and sustainable (Chen, 2022; Shittu et al., 2021). The accomplishment of waste entrepreneurship efforts is contingent upon market accessibility and supply chain integration. Access to markets that exhibit a need for circular goods is a crucial requirement for entrepreneurs. By integrating themselves into supply chains, entrepreneurs may facilitate efficient material flows and establish collaborative relationships with enterprises that actively seek waste resources for their circular operations (Mondal et al., 2023b; Singh et al., 2023). The establishment of collaborations and partnerships plays a crucial role in the progression of the “circular economy” and “waste management” endeavors. According to Rizos et al. (2016), these collaborative endeavors aim to unite a variety of stakeholders in order to cooperatively tackle intricate waste issues, exchange resources, and foster innovation. The tremendous worldwide ramifications and potential for scalability of waste-to-wealth concepts within the circular economy are noteworthy. These measures aim to effectively tackle environmental and economic concerns, foster sustainable growth, and alleviate the strain on natural resources. Furthermore, waste entrepreneurship is a dynamic and essential sector that significantly contributes to the progress of the circular economy. Waste entrepreneurship is motivated by a variety of factors, such as environmental considerations, adherence to circular economy principles, identification of market prospects, economic incentives, promotion of innovation, policy backing, and recognition of social benefits. This practice entails converting

waste materials into valuable resources, thereby making significant contributions towards fostering a sustainable and resource-efficient future. Waste entrepreneurship derives advantages from several facilitating elements when confronted with obstacles, including but not limited to favorable regulations, heightened public consciousness, financial resources, well-developed infrastructure, collaborative efforts, technological advancements, circular design principles, and consumer-driven demand. By leveraging innovation and embracing technological advancements, enhancing market accessibility, integrating supply chains, and fostering cooperation, waste entrepreneurship is positioned to facilitate profound transformation and optimize the opportunities presented by the circular economy.

6.1 Role of Sustainable Consumption and Production on Waste Entrepreneurship

The significance of sustainable consumption and production (SCP) is crucial for the accomplishment and growth of waste entrepreneurship. Sustainable consumption is the deliberate selection of products based on educated decision-making with the aim of diminishing the total demand for items that are resource-intensive and prone to generating trash. Through the adoption of environmentally friendly goods and the provision of support for circular economy initiatives, customers are able to generate market demand for solutions that convert trash into valuable resources. This, in turn, serves to incentivize waste entrepreneurs to engage in innovative activities and make investments in sustainable approaches. In contrast, sustainable manufacturing entails the strategic optimization of resource use, the reduction of waste generation, and the incorporation of circularity principles throughout the production process (Charter et al., 2017). The adoption of sustainable production techniques by companies provides waste entrepreneurs with increased access to a wider range of waste materials, enhancing their capacity to convert waste into valuable resources (Gunawan et al., 2020). The policies and efforts implemented by SCP (Sustainable Consumption and Production) provide a conducive environment for the development of waste entrepreneurship. Governments have the capacity to advance sustainable consumption and production (SCP) by implementing regulatory measures, offering incentives, and conducting awareness campaigns. These efforts aim to foster consumer acceptance of circular goods and stimulate market demand for sustainable solutions. Furthermore, SCP drives industry innovation and collaboration, fostering partnerships between waste entrepreneurs and established businesses to design circular supply chains and develop circular business models (Camilleri, 2018; Cordova-Buiza et al., 2022; Gunawan et al., 2020). Sustainable production and consumption play an important role in nurturing waste entrepreneurship by creating a market demand for circular products, providing a sustainable source of waste materials, and facilitating collaboration between stakeholders. As SCP continues to gain momentum,

waste entrepreneurship can thrive, making a significant contribution to the circular economy and environmental sustainability.

6.2 Role of Sustainable Consumption on Waste Entrepreneurship

Sustainable consumption methods, including buying only what is needed, choosing durable and long-lasting products, and avoiding single-use things, help reduce waste (Di Iorio et al., 2022; Kautish et al., 2021). Waste management promotes sustainable consumption (de los Mozos et al., 2020; Tudor et al., 2011; Valenzuela-Fernández & Escobar-Farfán, 2022). Sustainable consumption minimizes the environmental impact of product production, usage, and disposal (Glavič, 2021; Kumar et al., 2023; Naz et al., 2022). Waste entrepreneurship is critical to promoting sustainable consumption by reducing waste output, developing circular economy models, and encouraging resource recovery innovation (de Morais et al., 2021; Lakatos et al., 2018; Tunn et al., 2021).

6.3 Role of Sustainable Production on Waste Entrepreneurship

Furthermore, sustainable production tries to reduce the environmental impact associated with good production (Abreu et al., 2017; Blok et al., 2015; Yu et al., 2021). Waste management plays an important role in supporting sustainable production practices by lowering production costs through effective waste management measures such as recycling and waste reduction (Ahmad et al., 2021; Camilleri, 2022). Businesses can reduce their reliance on raw materials, which are sometimes expensive to extract and process, using recycled resources. Waste management can create a closed-loop system where materials are continuously circulated and reused by implementing recycling programs, encouraging product repair and refurbishment, and promoting the use of recycled materials in manufacturing (Mishra et al., 2020; Sinha et al., 2021). Reducing reliance on new resources and minimizing waste generation can also help improve a company's reputation and brand image (Ungerma & Dědková, 2020). Consumers are becoming more aware of environmental problems and are more willing to support businesses that use sustainable production practices, such as responsible waste management.

6.4 Role of Other (i.e., Green) Entrepreneurship

Green entrepreneurship, among others (i.e., entrepreneurship that helps in sustainability), helps advance the circular economy and achieve the SDGs (Mishra et al., 2022; Mondal et al., 2023a). Green entrepreneurs create circular business models to innovate and create sustainable company concepts. Entrepreneurs find waste-to-value opportunities, resource efficiency, and environmental impact reduction. Green entrepreneurs develop eco-friendly products and services. They prioritize energy efficiency, eco-design, renewable resources, and waste minimization (Habib et al., 2020). Green businesses promote resource efficiency, recycling, and sustainable supply chains with sustainable consumption and production by offering eco-friendly alternatives (Bai et al., 2018; Mishra et al., 2020, 2022). Green businesses protect the environment by optimizing resource consumption, clean energy, and technology; they promote solar and wind power and develop energy-efficient, carbon-reducing technologies. Green entrepreneurs promote sustainability and equity through innovation, sustainable product development, resource conservation, renewable energy promotion, collaboration, social and environmental impact, awareness, and policy advocacy (Potluri & Phani, 2020; Purwandani & Michaud, 2021). By creating new value from waste, waste as well as green entrepreneurs can contribute to “sustainable development” while creating new economic opportunities and reducing the negative impact of waste on the environment.

7 Conclusion

The discussion on waste entrepreneurship and the circular economy highlights the transformative potential of adopting circular practices in waste management. Waste entrepreneurship, driven by innovation, technology, and a sustainability mindset, plays a crucial role in reshaping traditional “waste management” systems and advancing the “circular economy”. Through the conversion of waste into valuable resources, waste entrepreneurs contribute to environmental protection, resource conservation, and economic growth, aligning with the principles of sustainability and circularity.

The notion of the circular economy and waste entrepreneurship presents innovative resolutions to the urgent issues of waste production, resource exhaustion, and environmental deterioration. The “circular economy” offers a promising alternative to the conventional linear model of “production and consumption” since it is based on concepts such as waste minimization, circular value chains, and collaborative innovation. The primary objective of this approach is to extend the lifespan of resources, optimize the extraction of their value, and facilitate the recovery and restoration of commodities at the conclusion of their life cycles. Waste entrepreneurship plays a key role in promoting the circular economy by discovering potential within the waste stream and innovatively transforming waste materials into useful

resources. Waste entrepreneurs play a significant role in mitigating the accumulation of garbage in landfills and reducing the release of “greenhouse gases” and “environmental pollutants”. Moreover, they actively advocate for responsible consumption and manufacturing methods. Waste entrepreneurs play a crucial role in achieving “Sustainable Development Goals” (SDGs), including SDG 8 (“Decent Work and Economic Growth”), SDG 9 (“Industry, Innovation, and Infrastructure”), and SDG 12 (“Responsible Consumption and Production”), via the conversion of trash into valuable resources and the establishment of novel enterprises. Furthermore, their endeavors in waste minimization and recycling provide a significant contribution to the achievement of SDG 13 (“Climate Action”) by effectively addressing climate change and fostering the adoption of sustainable corporate practices. There are a number of advantages associated with the implementation of circular economy techniques that extend to a wide range of areas. By prioritizing sustainability, resource efficiency, and waste reduction, the circular economy helps protect the environment, preserve biodiversity, and address climate change. It also fosters economic growth through the creation of new job opportunities, the development of innovative business models, and cost savings for businesses and consumers. Furthermore, circular practices enhance the resilience of supply chains and economies by reducing dependency on finite resources and encouraging local production and reuse. However, challenges remain in fully implementing the circular economy and waste entrepreneurship. Regulatory barriers, financing constraints, and technological limitations can hinder waste-to-wealth initiatives (Neves & Marques, 2022). To overcome these challenges, supportive policy frameworks, access to capital and technical support, and collaboration between waste entrepreneurs and established industries are essential. Public awareness campaigns can also play a vital role in endorsing responsible consumption and waste management and fostering a culture of sustainability. From a managerial standpoint, organizations must strategically prioritize innovation, research, and development alongside investments in new technologies. Supply chains should be reconfigured to prioritize closed-loop systems, resource recovery, and sustainable sourcing. Collaborations with suppliers, manufacturers, and waste entrepreneurs are indispensable in creating circular supply chains that promote circularity and value retention. Managers should actively seek partnerships with diverse stakeholders and engage in knowledge sharing, resource exchange, and joint initiatives. Educating and engaging consumers about the benefits of the circular economy and waste entrepreneurship is pivotal to driving demand for circular products and encouraging sustainable consumption. Furthermore, organizations must navigate evolving regulatory landscapes while advocating for supportive policies. Allocating resources and investments towards circular economy initiatives requires astute financial planning and aligning financial strategies with long-term benefits. Scaling up waste entrepreneurship within the circular economy carries significant economic implications, including job creation and economic growth. Organizations should recognize these opportunities and invest in waste-to-wealth initiatives to enhance profitability and competitiveness. Advocating for favorable policies and funding to support circular economy businesses is crucial, as is aligning organizational strategies with circular principles. From an environmental perspective, managers must

prioritize waste reduction, resource conservation, and sustainable sourcing to minimize ecological impacts. Implementation of circular economy practices, such as waste-to-wealth initiatives and closed-loop supply chains, can lead to reduced waste generation and environmental pollution. Communicating these environmental benefits to stakeholders enhances their reputations and promotes responsible resource utilization. On a social front, organizations can gain a social advantage by engaging with and empowering local communities in waste management initiatives. Providing job opportunities and skills development in the waste sector contributes to poverty reduction and social inclusion. Environmental education and awareness campaigns empower communities to actively participate in waste reduction efforts, fostering a more inclusive and sustainable circular economy. Therefore, waste entrepreneurship and the circular economy present promising pathways towards a more sustainable and equitable world. By converting waste into valuable resources and promoting responsible “production and consumption”, waste entrepreneurs contribute to the achievement of the SDGs, and the preservation of the ecosystem for future generations is of paramount importance. Embracing circular economy practices holds the potential to create an economy that exhibits enhanced resilience and resource efficiency, paving the way towards a sustainable future.

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Informal Waste Entrepreneurship: A Case Study of Roma Municipal Waste Collection in Hungary



Tim Gittins and László Letenyei

Abstract Roma communities are commonly associated with working in the informal economy. This study focuses on entrepreneurial practices of Roma individuals dealing in informal municipal waste collection in Hungary with enquiry set against a background of environmental sustainability embodied in the ‘circular economy’. Entrepreneurial ecosystem theory is subsequently drawn upon to guide an ethnographic research approach. Findings are thematically derived to create a foundation for integration of Roma entrepreneurial practices with circular economy oriented official waste collection policies. Outcomes primarily indicate existence of a market based transactional supply chain for informally collected waste material. Moreover, Roma informal entrepreneurship is opportunity oriented, driven by social capital formation and is serendipitously beneficial to society. Paradoxes also arise in conflicting purposes of formal and informal waste collection practices. The prime theoretical implication is that efforts to formalize Roma entrepreneurial activities should be considered against sustainable socio-economic benefits.

Keywords Informal entrepreneurship · Roma communities · Circular economy · Social capital · Municipal waste collection

1 Introduction

The informal economy is estimated to account for two-thirds of all enterprises globally (Williams & Oz-Yalaman, 2021) thereby emphasizing its socio-economic prominence. It thus acts as a prism for informal entrepreneurship which tends to be categorized as opportunity or necessity oriented (Audretsch et al., 2022; Fuentelsaz et al., 2018). Opportunity orientation implicitly assumes entrepreneurs are primarily driven

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